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its learning a good deal of visualization. The pattern of the movements is acquired and held, at least for the easiest parts of the series, as a whole simultaneously present in consciousness. Succession in time, on the other hand, is the special characteristic of processes with a strong motor element. It is possible that the law of distributed repetitions is a motor rather than a purely associative law, and that its validity in the learning of verbal material is due to the motor or articulatory factors in such learning.

XXIII. A SUGGESTED COEFFICIENT OF AFFECTIVE SENSITIVENESS

By HELEN CLARK, NEIDA QUACKENBUSH, and M. F. WASHBURN

It is a curious fact that in experimental studies of individual psychology no attention, so far as we are aware, has been paid to the characteristic which we shall call affective sensitiveness. By this term we mean a tendency to strong affective reactions, whether of pleasantness or unpleasantness. Evidently affective sensitiveness may be general or special. If it is general, and marked, the individual possessing it will tend to strong likes and dislikes whatever the nature of the material presented for affective reaction. If it is special, he will show sensitiveness to one kind of material and relative indifference to another kind. Hitherto, the only consideration has been whether an individual liked one kind of material and disliked another: our problem is to study his tendency to be strongly affected, in either direction, by one kind and to be left indifferent by another.

In attempting to find a means of measuring this character of affective sensitiveness, we proceeded in the following way. Forty pieces 2.9 cm. square of colored paper, chosen at random from the series of Bradley colors, were numbered on the back. A series of forty nonsense syllables, each composed of an initial vowel and a final consonant, was prepared and each syllable was numbered. The observer was then given the following instructions: "You will be shown successively five colors; then you will have pronounced to you five nonsense syllables; then you will be shown five colors, and so on until you have seen forty colors and heard forty syllables. As you look at each color, you are to express your judgment of its pleasantness or unpleasantness by speaking one of the numbers from 1 to 7, 1 meaning very unpleasant, 2 moderately unpleasant, 3 slightly unpleasant, 4 indifferent, 5 slightly pleasant, 6 moderately pleasant, 7 very pleasant. As you hear each syllable pronounced, you are to judge its pleasantness or unpleasantness in the same way. You will be given a 'Ready' signal before each color is shown and before each syllable is pronounced. Your eyes are to be closed except when you hear the signal 'Now,' when you are to open them and look at a color."

The colors were laid one at a time on a sheet of white paper on the table before the observer, who reported her judgment at once. The syllables were pronounced with as nearly as possible the same force and distinctness. The same order of colors and syllables was always followed. At the end of an entire series free introspective comments were made by the observer.

The results were treated in the following way. For each observer, we counted the number of 'indifferent' judgments made upon the colors, and also the sum of the numbers of 'very pleasant' and 'very unpleasant' judgments. We then divided the number of 'indifferent' or 4 judgments by the number of 'very pleasant' or 7 judgments plus the number of 'very unpleasant' or 1 judgments. The quotient was a number which varied inversely with the affective sensitiveness of the observer to colors: it was larger the more indifferent the observer was to this kind of material. We could just as well have inverted the fraction and obtained a number which would vary directly with affective sensitiveness. Either number furnishes a good index of this particular character. Of course if either the numerator or denominator happens to be zero, we can hardly conclude that the affective sensitiveness is infinitely great or small, but where the numbers have a finite value the index would seem to be roughly serviceable. A similar index was reckoned for each observer's judgments on the nonsense syllables.

Those observers for whom the ratio of indifferent judgments divided by extreme judgments was 1.5 or more were rated as decidedly indifferent to the kind of material used. Those for whom the ratio was .5 or less were ranked as decidedly sensitive. If an observer's ratio fell between these extremes (which were not, of course, held to with mathematical rigidity), she was classed as fairly sensitive.

There were seventy-seven young women observers. Among them, the largest sub-group was formed by those who were very sensitive to both the colors and the sounds. This was characteristic of twenty observers. Next in size came the group who were very indifferent to both: of these there were fifteen. There were thirteen who were very sensitive to colors and fairly sensitive to sounds; eight who were very sensitive to colors and very indifferent to sounds, seven who were fairly sensitive both to colors and to sounds, five who were fairly sensitive to colors and very sensitive to sounds, five who were fairly sensitive to colors and very indifferent to sounds, two who were very indifferent to colors and very sensitive to sounds, and two who were very indifferent to colors and fairly sensitive to sounds.

From these figures, it is clear in the first place that colors provoke a strong affective reaction in more observers than articulate sounds do, under the conditions of our experiment. The total number of observers who were very sensitive to colors was forty-nine; the total number who were very sensitive to sounds was twenty-seven. The total number who were very indifferent to colors was nineteen; the total number who were very indifferent to sounds was twenty-eight.

Secondly, it appears that there is a tendency for observers who are either very sensitive or very indifferent to one kind of material, to have the same affective attitude toward the other kind. The two largest groups were those of persons who showed great sensitiveness to both colors and sounds and of persons who manifested great indifference to both. There is a greater probability that an individual will display general affective sensitiveness, if we may call it general when we have used only two kinds of material to test it, than that he will show specialized sensitiveness to either colors or sounds. It must be remembered that the general situation is a part of the source of the affective reaction. There are probably people who cannot get any strong affective experience in the constrained and artificial surroundings of the experiment, while others are less embar-

passed by their environment. Since the situation is practically the same with both kinds of material, it probably tends to make the affective response for colors similar in intensity to that for sounds in the case of many observers.

Thirdly, there exists a small but interesting group of observers who are strongly stirred affectively by one kind of material and left markedly indifferent by the other kind. As we should expect, there was more specialized sensitiveness to colors than to sounds: eight persons were very sensitive to colors and very indifferent to sounds, while in the case of two only was the relation reversed.

What makes an observer give strong affective reactions to one kind of material and weak ones to another kind? Has this characteristic anything to do with imagery? We should not expect that the frequent use of a certain kind of imagery, or the capacity to experience it with especial vividness, would produce any especial affective sensitiveness to sense-impressions of the corresponding modality. We do not need to recall color imagery in order to find a color pleasant or unpleasant. On the other hand, the reverse causal relation might very likely exist. A person who had strong likes and dislikes for the sense-impressions of a given modality would naturally tend to give more attention to them, and this might result in more frequent and more vivid imagery belonging to the modality in question.

We must leave for further investigation the problem of the characteristics which are correlated with specialized affective sensitiveness. So far as our results go, they indicate an entire lack of correlation with either the type of imagery most useful in memorizing, or the type occurring most readily and vividly as an illustrative accompaniment to reading. All our observers who showed specialized sensitiveness, as well as some who were very sensitive and some who were very indifferent to both kinds of material, were subjected to the following tests from Fernald's "The Diagnosis of Mental Imagery" (Psych. Monographs, vol. 14, no. 1): the rhyming tests (page 28), the similar spelling tests (page 28), the test for memory of words similar in sound but spelled differently, and that for auditory memory of words spelled alike but differing in sound (page 29), and the reading tests for illustrative imagery (pages 139-143). In each of these tests, some of the observers who did best were especially sensitive affectively to the corresponding kind of sense impression, while others who did equally well were especially indifferent.